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THE NATIONAL MUSEUM OF TOOLS AND THE MACHINE TOOL HALL OF FAME

Watch Making Tools and Machine Tools

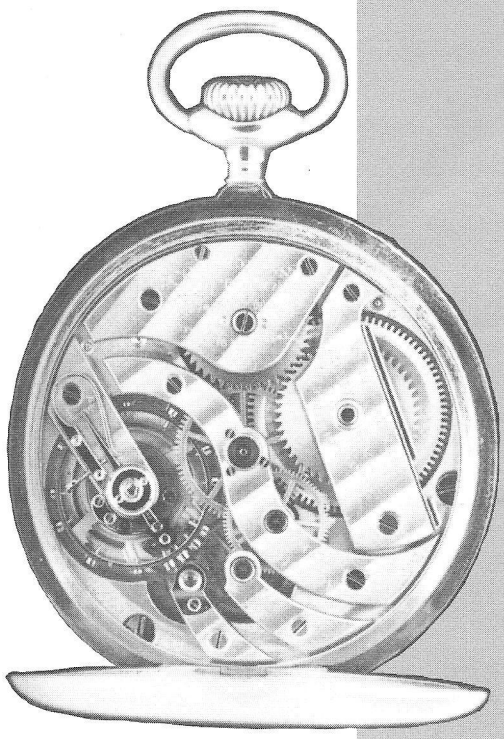
The Contribution of Edward Rivett

by Thomas M. Hammond

The importance of precision to the rise of the American watch industry is obvious and has been well-documented. Much less attention, however, has been devoted to the contributions of a related industry: the makers of precision tools used by watch repairmen. Several firms which became famous for top-quality toolroom and production machinery had their beginnings in the watch-tool industry. Prominent among them was the company founded by Edward Rivett.

My attention was originally drawn to Rivett by the chance discovery, in 1980, of a rather battered and incomplete 608 toolroom lathe, supposedly used in the munitions shop at Pearl Harbor, among a variety of miscellaneous items being sold by a Boys' Club in Hilo, Hawaii. I bought it and spent several interesting years restoring it. Along the way, I began researching the history of the company that made it. When I learned that Rivett had once made watchmakers' lathes, I began searching for examples of these, and their study has been one of my main preoccupations ever since. As is so often the case, the more I learn, the larger the unknown part of the story becomes.

Edward Rivett was born in 1851 in L'Assomption, Quebec, near Montreal. I have been unable to learn anything of his family or early years, beyond the fact that he received only a "common school education"—perhaps the equivalent of completing eighth grade. The economy in mid-19th century Canada, particularly the French-speaking regions, was chronically depressed, and many Canadians emigrated to the United States looking for work. Large numbers settled in the New England states, where the developing factory economy provided jobs. Edward apparently did the same, for he was employed in a Rhode Island cotton mill by the age of fifteen. At twenty, after two years in Massachusetts shoe factories and two years as night overseer in a Louisiana textile factory,



Pocket watch movement. Photo courtesy of the Roberson Museum and Science Center.

he was working at the New York Watch Company (later to become Hampden Watch Company) in Springfield, Mass. I have not been able to discover what position he filled there, but it is tempting to suspect that he was learning about both watches and the machinery that made them.

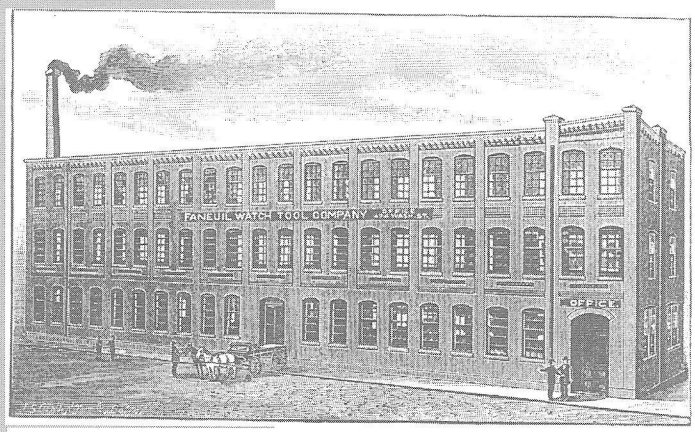
In 1872 he left Springfield and moved to Boston, where he went to work for C. A. W. Crosby, a thriving jeweler and watchmaker with premises in the downtown shopping district at 474 Washington Street. Rivett seems to have worked for Crosby as a watch repairman, but as time went on he began developing improvements, both to the watches he worked on and the tools he used. His earliest patent, dated 1880, is for an improved hair-spring stud.

At some point Rivett and Crosby decided to manufacture watchmakers' tools. During the late 1870s and early 1880s this was a growth industry, with numerous companies being formed for the purpose in New England, the Middle Atlantic states, and the Midwest. Most had relatively short lives, with many companies disappearing in the recession of 1893. Some survived, mostly by diversifying into the more profitable areas of precision toolroom and manufacturing machinery. Rivett and Crosby's creation followed the same path.

Faneuil Watch Tool Company was formed in 1884, with Rivett as Manager and Crosby as Treasurer. The company name may have been taken from Boston's Revolutionary War landmark Faneuil Hall, or from Faneuil Station on the Boston and Albany Railway, near the company's location in Boston's Brighton district. The first "factory" was said to have been a wooden addition to Rivett's home. Later a brick factory was built at 1 Brooks Street, where the company remained until the area was "redeveloped" by a freeway in the 1950s.

In 1887 Rivett was granted patent #363,000 for several features of a watchmakers' lathe that would characterize Rivett tools for the next thirty years. The early Rivett lathes were similar to, though slightly larger than, the typical products of contemporary makers such as the American Watch Tool Company or Moseley, with a center height of 2 3/16" rather than the more common 50 mm, a steel rather than cast iron bed, a tool holder for the slide rest taking round tools in an eccentric quill, and a knee (which Rivett called a revolvable tailstock) to hold the slide rest upright for wheel cutting and milling.

By 1890 Faneuil Watch Tool Co. was also manufacturing a staking tool and other watchmakers' small tools and had begun production of mechanics' bench lathes, which would become the company's dominant product and eventually exclude further production of watch tools. Edward Rivett received numerous patents in the late 1880s and 1890s, with the focus gradually shifting toward larger precision machinery such as internal grinding machines. The company's products won the highest award at the 1887 Mechanics' Fair in Boston, and a gold medal at the 1893 World's Fair. In their advertising in jewelers' trade journals, the company claimed to make only tools of the highest possible quality, and their prices were always above those of their competitors. When "The Rivett" lathe sold for $52, one could buy an American Watch Tool Company "WW" lathe for $38, and a Moseley No. 2 Conoidal lathe (with seven collets) for $42. The prices of all watchmakers' lathes steadily dropped between 1880 and 1890, presumably due to oversupply, but Rivett lathes always commanded a premium over their competition.

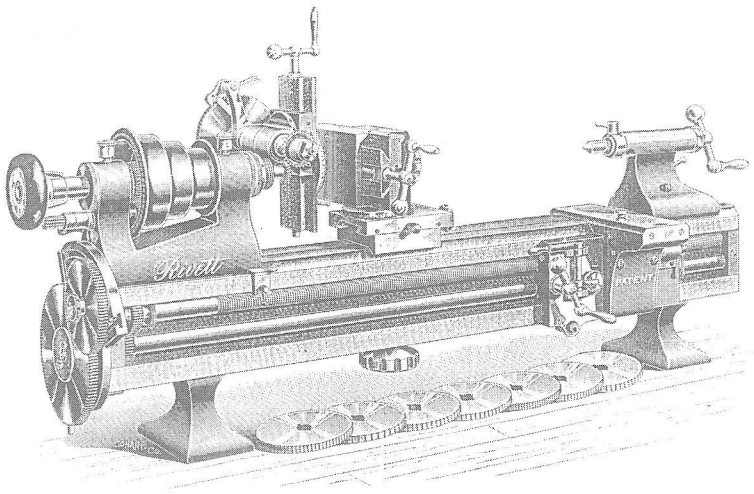


Faneuil Watch Tool Company factory in 1899.

By 1892 Faneuil Watch Tool Co. had built a new three-story, 10,000 sq. ft., brick factory building which they claimed was "the largest in the country for the manufacture of watch-tools." Actually, this claim was a bit disingenuous, as the same factory was also producing the No. 3 and No. 4 bench lathes, but this seems to have been typical of the industry. American Watch Tool Company also made a bench lathe and factory tooling for watch manufacturers, as did Moseley. Stark even made ballot boxes to keep his company busy!

C. A. W. Crosby died in April 1894, and his son John D. took over as company treasurer, but the majority ownership was now split among several Crosby heirs and Edward Rivett seems to have exercised more complete control of the company. In 1895 he introduced a greatly modified version of his watchmakers' lathe, after having made approximately one thousand of the earlier model. This had a center vee-guide for the alignment of headstock and tailstock,

rather than the previous beveled edges of the bed, but the most significant change was in the headstock bearing design. Rather than the industry-standard double angle (3° and 45°) conical bearings at both ends of the spindle, the new Rivett lathe had a rear bearing with parallel inner and conical outer surfaces, adjusted by a screw which drew it into a matching tapered hole in the headstock casting. The double-angle bearing at the front of the spindle was retained to absorb axial thrust from cutting tools and the tailstock. A fine-pitch nut on the spindle controlled end shake by adjusting the clearance between the pulley (with an integral cast iron sleeve keyed to the spindle) and the front headstock bearing. Rivett apparently arrived at the parallel bearing form through development of his new line of high-speed grinder spindles (which he advertised as able to withstand running at 100,000 RPM) and used it extensively thereafter on lathes and grinders of all sizes. A similar bearing was used, slightly later, on both ends of the spindles of Hardinge "Cataract" lathes and mills, with end thrust taken by a ball bearing.



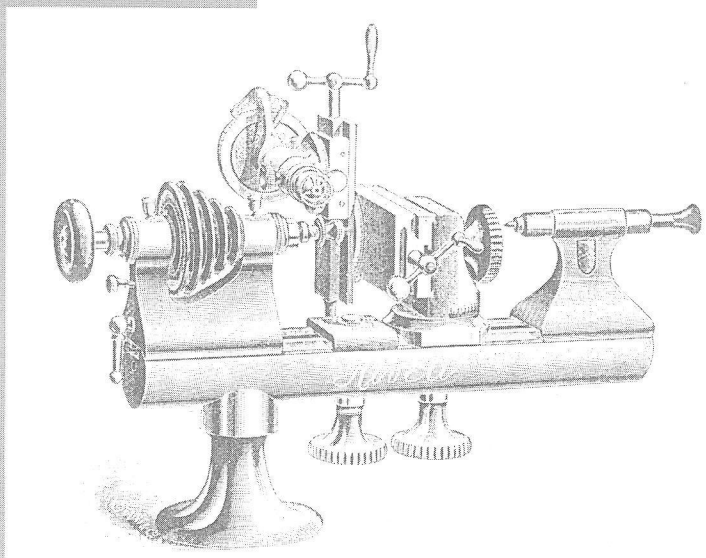
Rivett watchmakers' lathe, circa 1900.

Also at this time, Rivett introduced his "Eight-Inch Precision Lathe" which was a development of the No. 4 bench lathe, with a massive saddle sliding in a dovetail on the front of the bed, and leadscrew and feedshaft drives. This was probably the most versatile and precise lathe on the market, and its success further encouraged the company to move toward specialization in toolroom-size machinery. Interestingly, not only were many features of the large lathe, including its spindle and bearings, directly derived from the new watchmakers' lathe, but a large proportion of the very wide line of attachments and accessories could be obtained in sizes to match any of Rivett's lathes. An 1898 catalog specifically states about the watchmakers' lathe accessories: "Any of the following attachments which are not regularly made for the large lathes will be made to order when desired." The "Eight-Inch Precision Lathe" sold for a minimum of $500, and a well-equipped one, able to perform such tasks as spiral milling and form-relieving, could easily exceed $1,000.

In 1903 Edward Rivett was able to purchase the late C. A. W. Crosby's interest in Faneuil Watch Tool Co. from Crosby's heirs, and renamed the firm "Rivett Lathe Manufacturing Company". On the watchmakers' lathes, this name began appearing from serial numbers around 2100, indicating production of approximately another thousand small lathes to the new design between 1895 and 1903: an output of about one lathe every three days. At this time the American Watch Tool Co. was producing two lathes a day, and Stark reported making one every two days. Moseley's production numbers are not known, but were probably somewhere in the same range.

Business appears to have grown rapidly after the turn of the century, and in 1908 Rivett opened another addition to his factory which doubled its capacity. However, it became clear that the watchmakers' lathe market did not offer the scope for revenue and growth that the toolroom machinery market did—a Rivett ad from a 1911 jewelers' trade journal stated "Our ads. have been absent for some time because we could not keep up with our orders; we were so busy that we had neither time for, nor need of, advertising. While we are devoting most of our time to the more profitable manufacture of our Grinders and Precision Bench Lathes, which sell on an average of $1000.00 each, being the highest priced Bench Lathes in the world, we are still making a certain number of Watchmakers' Lathes every year, following the urgent request of expert Watchmakers throughout the country who appreciate an accurate and up-to-the-minute Lathe." In the same year another ad stated "The whole success of the Rivett Lathe has been in Mr. Rivett's ambition to get out the finest lathe in the world and then it would sell itself, which has been proved as we have never had a salesman on the road. All the craft are invited to visit our factory, and will find Mr. Rivett to be the first one there in the morning and the last one at night, and nine-tenths of his time is spent among his workmen."

In 1912, at the age of 61, Edward Rivett decided to sell the company and retire. Although he took no further part in the business, he lived to nearly 87, dying in December of 1937. His obituary in *American Machinist* stated "Mr. Rivett believed himself to be the originator of precision in bench lathes and small internal grinders" and "Unusual mechanical skill, an inquiring mind, and initiative were qualities that aided Mr. Rivett in building precision into his machines. His designs were worked out at the bench and his men built early models from sample pieces" and "In his opinion many modern shops have an impersonal attitude toward their products, and it was his delight to find one where no amount of time or trouble was too much to give in the search for perfection."



Rivett 608 toolroom lathe in 1956.

The new owners were a group of investors who changed the name to The Rivett Lathe and Grinder Company. Probably due to demand arising out of World War I, business was initially very good, and further additions to the factory were made in 1915 and 1920. The company's finances, however, became increasingly troubled, and the company was reorganized yet again, emerging as The Rivett Lathe and Grinder Corporation in 1923. At about this time the company, which had probably made few if any watchmakers' lathes in the past ten years, disposed of its remaining stock of replacement parts, attachments, etc. to F. W. Derbyshire of Waltham, Massachusetts, who continued to service Rivett watchmakers' lathes for some time, alongside its own lines of Webster-Whitcomb, Magnus and Elect lathes.

Rivett Lathe and Grinder barely survived the Great Depression, making only a few dozen lathes in some years, but business began to improve as World War II neared. A substantial number of the company's 608 toolroom lathes, direct descendants of Edward Rivett's "Eight-Inch Precision Lathe," were sent to England on Lend-Lease, and after American rearmament began, production of the larger lathes and grinders soared. During the war the company's annual production reached almost 900 lathes and grinders in 1941. Peace, unfortunately for Rivett as for most other tool makers, left the company with production capacity greatly in excess of demand, and led to the search for other means of survival. Hydraulic controls were added to the product line, along with some very sophisticated but rather unwieldy toolroom and turret lathes.

In the late 1940s and early 1950s, Rivett Lathe and Grinder Corporation recommenced the manufacture of watchmakers' lathes, to a new design; these were known as the 1R or Ball Bearing model. I have been told that the idea of making them arose in response to the large number of returning servicemen needing vocational training. Some of the veterans would be learning watchmaking. The company hoped that, in training schools and later as these new watchmakers set up in business, there would be a market for a high-quality, American-made watchmakers' lathe. Apparently this hope was disappointed: only five or six hundred of the 1R Ball Bearing lathes were ever produced.

The Korean War brought another brief period of prosperity, followed by yet another cycle of over-capacity and under-utilization. Production dropped to less than fifty lathes and grinders annually from 1954 on, and the company finally disappeared in the mid-1960s. Applied Power Industries Incorporated, makers of fluid drive components, purchased Rivett to gain control of the hydraulic valve and control part of the business. They merged it with Dynex Company, another subsidiary, to form Dynex-Rivett, still surviving in Pewaukee, Wisconsin with a branch in Ashland, Massachusetts. The machine tool part of Rivett was sold to Leland-Gifford Company of Worcester, Massachusetts, makers of production drilling machinery. Rivett machine tools continued to be advertised for about a year, under the title "Rivett Lathes & Grinders, manufactured by Leland-Gifford Co." In 1967, however, Leland-Gifford itself was acquired by White Consolidated. That same year the Rivett machine-tool business was transferred to White's Fay-Scott Division in Dexter, Maine, and no further Rivett

tools were produced. For reasons that are still unclear, all relics of the Rivett business were apparently buried in a Maine landfill early in the 1970s.

A considerable number of the company's products have survived, and many are still in use. The 608 lathe in particular is sought after as a home workshop machine, as are the larger 1020 and 1030 lathes. Among horologists, Rivett watch lathes maintain their reputation as probably the best ever made, and seem to be ageless. I own and regularly use one that is more than 110 years old — what folly it seems, in this age of expendability, to sell tools that never wear out! Edward Rivett could not have conceived of doing it any other way and his products, still treasured and productive, form the best memorial he could have wanted.

Sources:

Ward Goodrich (pseud. for Charles E. Walker), *The American Watchmaker's Lathe, Its Use and Abuse,* 1903, Hazlitt & Walker; reprinted by North American Watch Tool & Supply Company, Chicago, 1974.

Michael C. Harrold, *American Watchmaking: A Technical History of the American Watch Industry 1850 - 1930,* Columbia, PA: National Association of Watch and Clock Collectors.

Donald R. Hoke, *Ingenious Yankees: the rise of the American system of manufactures in the private sector,* New York: Columbia University Press, 1990.

Orra L. Stone, *History of Massachusetts Industries; Their Inception, Growth, and Success,* Boston & Chicago: The S. J. Clarke Publishing Co., 4 volumes, 1930.

Anon. obituary "Edward Rivett (1851 - 1937)," *Transactions of the American Society of Mechanical Engineers,* Vol 62, p. 1440.

Anon. obituary "Edward Rivett," *American Machinist,* Dec. 29, 1937, p. 1280h.

Faneuil Watch Tool Company (Boston, Mass.) catalogs for 1888, 1898 and 1902.

Rivett Lathe Manufacturing Company (Boston, Mass.) catalogs for 1908 and 1911.

Rivett Lathe & Grinder Company (Boston, Mass.) catalogs for 1918, 1936 and 1954.

Advertisements by Faneuil Watch Tool Company in *The Keystone* and in *Jewelers' Circular,* various issues 1887 - 1903.

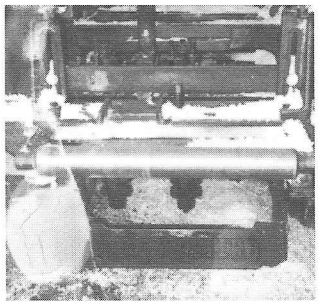
Advertisements by Rivett Lathe Manufacturing Company in *The Keystone,* various issues 1905 - 1912.

Members' Forum

Correction

In the last issue of *Tools & Technology*, we printed a brief essay by William Nash, on the history of the tools which he recently donated to the Museum. Unfortunately, we mistakenly placed Professor Nash at a non-existent university in the United Kingdom. William Nash is actually Professor of Mechanical Engineering at the University of Massachusetts, Amherst. We apologize for the error.

Special Request from the Adirondack Museum



Enclosed are photos of a wood planing machine owned by a man in this area.The machine is belt driven, and has both planing and edging knives for shaping various projiles. On the cast iron frame are the words "American" on the side and "Happy Thought" on the end. Does the name or motto mean anything to your staff or members? We would love to know where the piece was manufactured and by whom (is American the company name?). Anything you can tell us about this piece would be much appreciated.

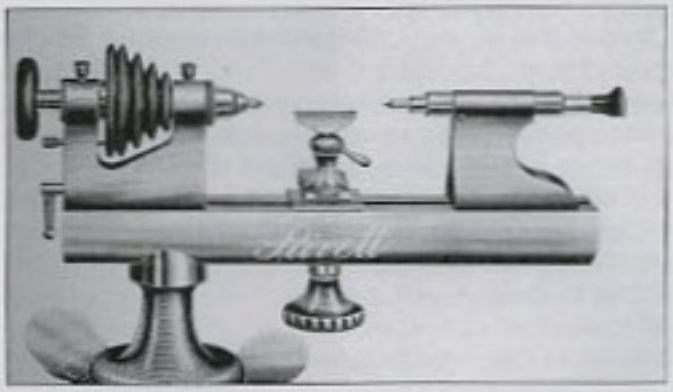
Jane Mackintosh, Curator
The Adirondack Museum

Rivett Revisited

Edward Rivett from the poster "American Machine Tool Builders" published as a supplement to American Machinist, *September, 1903.*

In the Fall 1999 issue, the captions on two of the Rivett illustrations were reversed. The picture on page 3 shows a Rivett 8-inch Precision Lathe with milling and indexing attachments, dating from around 1900. The illustration on page 4 shows an early Rivett watchmaker's lathe set up for wheelcutting, dating from about 1895.

We are pleased to take this opportunity to show additional Rivett illustrations.



Rivett watchmakers' lathe.

The author of the article on Edward Rivett, Thomas M. Hammond, is retired after almost thirty years of teaching Physics and Oceanography at Hawaii Community College in Hilo Hawaii. He and his wife now live in Forest Grove, Oregon where, in addition to research on Rivett watchmaker's lathes, they pursue hobbies of travel and birding.

Labor Day

Our Labor Day celebration brought to the Museum many local people who had never before visited. The comments below were left in the Guest Book & Visitor Survey Form by the custodian at a local school.

John Alexander, collections technician for APM, demonstrates a lathe to a visitor on Labor Day.

Thank you very much for the free admission with a union card on Labor Day. I have been meaning to come to the museum for some time now, but somehow never got around to visiting. With the free admission on a day off, I finally made it. I was very, very impressed with the museum! It made me proud to live in the area, sort of proud to be an American living in this wonderful historic region.

I especially want to thank you all for honoring American Laborers with the chance for free admission. That, too, made me feel special and proud, and that is truly rare! Labor Day has changed a great deal during my lifetime (I'm 42 years old). It seems to have lost its original intent–which was to celebrate and honor American laborers Thank you.